#### 3.3 NOISE

This section analyzes existing noise levels in the project vicinity and impacts the alternatives may have on future noise levels. The analysis examines potential impacts created by the Proposal and its alternatives, using computer-modeling projections.

# 3.3.1 Existing Conditions

## 3.3.1.1 Methodology

The analysis of noise impacts involved two separate phases: monitoring of existing background noise levels and computer modeling of future project-generated levels. Measurements of 24 hours duration were taken at seven locations most likely to be affected by project-generated noise. Measurements were made on two consecutive days with one site monitored on both days to serve as a point of comparison. Winds were generally southerly and light. There were periods of light rain during the two days of monitoring. The calibration of the meter was checked before and after each reading with an acoustic calibrator, itself calibrated to a known source.

Modeling of future project-generated noise levels involved collecting noise samples of mining machinery from several operating mines and facilities, including Cadman, Inc.'s Black Diamond pit, Ellensburg Cement Products facility, CSR's Everett Asphalt facility, and the 410 Quarry at Enumclaw. Every attempt was made to sample equipment very similar to that being proposed for the North Bend Mine. The asphalt and concrete plants, front-end loaders, crushers and screens that were sampled are either identical or very similar to those being proposed. The noise measurements obtained form part of the input for a comprehensive noise prediction program known as the Environmental Noise Model (ENM). Other required inputs included detailed topographical information digitized from USGS topographical maps and project site maps, locations of the nearest residential properties, and meteorological data.

## 3.3.1.2 Definition of Noise and How it is Measured

Noise is defined as excessive or undesired sound. Human sensitivity to sound depends on its intensity, frequency, composition, and duration. Noise is measured on a scale whose units are termed decibels (dB). In order to represent the wide range of sounds audible to the human ear, this scale is logarithmic. With this scale an increase of 10 dB is perceived as a doubling of apparent loudness, and an increase of 3 to 5 dB is noticeable under typical listening conditions. Sound levels from a number of sources combine nonlinearly (for example, a project noise level of 50 dBA upon a receiver with an existing background noise level of 50 dBA results in a cumulative noise level of 53 dBA resulting in a project impact of 3 dBA).

The greater sensitivity of the human ear to certain frequencies is approximated by skewing (or weighing) the decibel scale toward those frequencies. The weighted decibel scale that best approximates the response of the human ear is known as the A-weighted scale (dBA). The equivalent sound level (Leq) is widely used for analysis purposes. The equivalent sound level is the level of a constant sound having the same sound energy as the fluctuating levels measured over a period of time. Minimum and maximum noise levels represent the range of the existing noise environment. The maximum noise levels are due to single events

that may or may not be typical of the monitoring site. The magnitudes of typical noises are shown in Table 3.3-1.

TABLE 3.3-1 WEIGHTED SOUND LEVELS AND HUMAN RESPONSE

Sound Source	dBA	Range of Human Response
Aircraft carrier operation	140	
Jet takeoff (200 ft away)	120	Painfully loud
Riveting machine	110	Maximum vocal effort
Shout (0.5 foot away)	100	
Heavy truck (50 ft. away)	90	
Busy street	80	Hearing damage with continuous exposure
Freeway traffic (50 ft. away)	70	Telephone use difficult
Air conditioning unit (20 ft)	60	
Light auto traffic	50	Quiet
Bedroom, library	40	
Soft whisper	30	Very quiet
Broadcasting studio	20	
Undefinable	10	Just audible
Undefinable	0	Threshold of hearing

Source: U.S. Council on Environmental Quality

Noise levels are affected by distance and physical buffers. Noise levels decrease as the distance from the source increases. As the distance from a point source (such as a rock crusher) doubles noise levels would decrease by 6 dBA. Noise attenuation is greater over soft or rough ground compared to hard smooth surfaces such as concrete, asphalt, or water. Dense trees can reduce noise levels if their trunks and branches completely block the view between source and receptor and/or their roots loosen the soil. A dense and deep buffer (100 meters) of evergreen vegetation can reduce noise by a maximum of 10 dBA.

## 3.3.1.3 Regulation of Noise

#### FEDERAL GUIDELINES

EPA Region 10 (Pacific Northwest) has developed draft guidelines indicating that an increase of less than 5 dBA is insignificant (causing few complaints), 5-10 dBA is significant (causing more complaints), and an increase exceeding 10 dBA is a serious impact (leading to many more complaints). Mitigation is usually not required for impacts of less than 5 dBA. The EPA guidelines are not standards and do not have the force of law but do serve as indicators for potential noise impacts.

#### STATE AND LOCAL REGULATIONS

The Washington State Department of Ecology (Ecology) has developed maximum permissible noise levels that vary depending upon the land uses of the noise source and the receiving property. King County has developed very similar noise regulations. The County's noise standards are shown in Table 3.3-2. The standards applicable to the Proposal are shown in bold. In general, the closest residential properties are north of the Lower Site and are in rural zones; the WoodRiver development is in a residential zone; and Seattle Truck Town East and the other businesses along Edgewick Road (468th) are in a commercial zone. The Lower Site is bordered on the east by public ownership and west by commercial forestry land (owned by Weyerhaeuser Real Estate Company), on the south by the right-of-way for I- 90, and on the north by

144th Street, a commercial street. On the north side of 144th are residential lots with rural/residential zoning.

TABLE 3.3-2 MAXIMUM PERMISSIBLE SOUND LEVELS (in dBA)

	Land Use of Receiving Property				
Land Use of Source:	Rural	Residential	Commercial	Industrial	
Rural	49	52	55	57	
Residential	52	55	57	60	
Commercial	55	57	60	65	
Industrial	57	60	65	70	

Between 10 p.m. and 7 a.m. on weekdays and 10 p.m. and 9 a.m. on weekends, the maximum limits for residential receivers are to be reduced by 10 dBA within residential and rural receivers. For noises of short duration, these limits can be exceeded by a maximum of 5 dBA for 15 minutes/hour, 10 dBA for 5 minutes/hour, or 15 dBA for 1.5 minutes/hour.

In King County, the noise from construction activities is exempt from noise standards during daylight hours (7 a.m. to 10 p.m. weekdays and 9 a.m. to 10 p.m. weekends) for receivers in rural and residential districts. Some types of noise are fully exempt from the Maximum Permissible Noise Level standards such as noises from construction activities (in commercial zones) and safety equipment. For example, backup alarms or sirens (King County Ordinance 12.94.010.B.3 and 12.94.010.2).

Motor vehicle traffic traveling on public roads is exempt from the noise regulations summarized in Table 3.3-2, but the project's onsite traffic is not. Ecology has motor vehicle performance standards setting forth the maximum noise level from individual vehicles (and not applicable to general traffic noise) measured under specific testing criteria. These performance standards are applicable to vehicles operating on private roads such as the gravel mine access road.

It is assumed for purposes of this study that the "Rural" zoning currently in place for the properties adjoining the project property to the north would be applicable into the future. The measurement locations are described in Table 3.3-3 and the results are summarized in Table 3.3-4.

TABLE 3.3-3 24-HOUR NOISE MONITORING SITES

Site	Starting Time & Date	Location
Site 1	1:00 p.m. 3-17-99	Adjacent to SW corner of Lu residence
Site 2	1:00 p.m. 3-17-99	Adjacent to SE corner of WoodRiver
Site 3	1:00 p.m. 3-17-99	Located on east property line of 14110 475th
Site 4	1:00 p.m. 3-17-99	Located on potential new school site at Lake Dorothy Road
Site 5	2:45 p.m. 3-19-99	Located on Middle Fork Road
Site 6	2:45 p.m. 3-19-99	(Identical to Site 1) Adjacent to SW corner of Lu residence
Site 7	2:45 p.m. 3-19-99	Located on 47230 144th
Site 8	2:45 p.m. 3-19-99	Located at the north property line of the Edgewick Inn
Site 9	11:00 a.m. 12-14-99	Short-term traffic noise at Olallie State Park

Details of site location:

Sites 1 and 6 – 17 feet south of SW corner S18 T23N R93

Site 2 – 95 feet north of SE Middle Fork Road

Site 3 – Approx. 230 feet east of south end of 475th

Site 4 – Located 60 feet north of and 270' east of SE Middle Fork Road

Site 5 – Located approximately 20 feet south of and 500 feet east of Middle Fork Road. in the 49200 block

Site 7 – Located 60 feet north of 144th and 30 feet west of driveway to 47230

Site 8 - Located on east property line of the Edgewick Inn and 45 feet south of 146th

Site 9 – Located in Olallie State Park 60 feet north of SE Grouse Ridge Road

## 3.3.2 Existing Conditions

The North Bend area adjacent to the project site currently receives noise from a variety of sources, with traffic being the major source. Noise from the long westbound descent of I-90 into North Bend was noticeable at all of the measurement sites. Local truck and passenger car traffic was noticeable at Sites 2 (WoodRiver) and 4 (potential school site). A description of each receiver site is provided in Table 3.3-3.

TABLE 3.3-4 MEASURED NOISE LEVELS (in dBA)

Monitoring Location	Minimum	Maximum	Leq 24-Hr	Day Leq	Night Leq	Highest 1-Hr Leq	Ldn
Site 1	30.8	76.3	48.5	49.5	46.9	55.3	52.5
Site 2	36.0	71.0	51.0	53.0	48.7	55.8	55.0
Site 3	31.8	73.0	44.6	45.4	43.5	52.1	48.6
Site 4	38.3	88.2	51.5	52.9	49.8	57.2	55.5
Site 5	36.4	78.6	45.8	48.6	41.5	52.8	49.8
Site 6	28.4	70.4	50.0	51.4	47.6	55.6	54.0
Site 7	32.4	67.5	50.2	51.6	48.1	55.9	54.2
Site 8	49.2	79.2	57.6	57.6	57.6	60.7	61.6
Site 9	44.0	105.1	NA	NA	NA	55.6	NA

# 3.3.3 Environmental Impacts

# 3.3.3.1 Construction Impacts

The construction phase of the North Bend Gravel Operations Project consists of:

• Removing the overburden from the Lower Site in order to build an earthen berm on the north and south sides of the processing area

3.3-4

- Disposing of unusable woody material ("slash")
- Clearing a route for the aggregate conveyor transversing the western slope of Grouse Ridge
- Excavating the floor of the Lower Site down to the design elevation of 640 feet and expanding the floor area to accommodate the aggregate processing facility, the concrete and asphalt facilities

## ALTERNATIVE 1 - NO ACTION

There would be no impacts under this alternative.

#### ALTERNATIVE 2 – PROPOSAL

Construction at the Lower Site will consist of deepening the existing gravel pit, constructing a fresh water storage pond; building access roads, building the asphalt and concrete batch plants and removing the overburden in order to build the noise berms. Construction noise comes from heavy equipment such as bulldozers, front-end loaders and belly-scrappers. Construction noise impacts were modeled using the ENV model with project-oriented levels ranging from 0 at some of the residences south of I-90 to 17 to 21 dBA along SE 144th Street. Construction noise impacts upon rural or residential property are exempt from the King County Maximum Permissible Noise Levels during daytime hours and would not exceed them during evening hours. The cumulative noise levels during construction would be unchanged from current conditions.

## **Alternative 2 – Lower Site Option**

Construction noise levels will be nearly identical to those of Alternative 2 except that the smaller footprint will require less time to excavate than for Alternative 2.

## ALTERNATIVE 3 – LOWER AND UPPER SITE OPTION (EXIT 34 AND EXIT 38)

Alternative 3 would have construction activities and noise impacts identical to Alternative 2.

## **Alternative 3 – Lower Site Option**

Construction noise levels will be nearly identical to those of Alternative 3 except that the smaller footprint will require less time to excavate than for Alternative 3.

#### ALTERNATIVE 4 – UPPER SITE ONLY (EXIT 38)

Construction activities consist of preparing access roads and a processing plant area on the Upper Site. The noise impacts from these activities will be minor.

## 3.3.3.2 Operation Impacts

A summary of the operation equipment (including locations) for each alternative is given on Table 3.3-5. The noise data for this equipment are summarized in Table 3.3-6.

A number of methods, both manual and computerized, exist to calculate noise levels at various distances from new planned noise sources. One of the more comprehensive methods involves the use of the ENM. The ENM model requires data on the frequency distribution of each noise source, the topography of the site, the locations of properties receiving the noise, and meteorological data that affect noise propagation. Two basic meteorological conditions would cause the highest noise levels from a source, either high winds which "bend" the sound waves toward a ground-level receiver or a low inversion layer that inhibits sound waves from dispersing upwards. Both conditions do not occur simultaneously but moderate wind speeds and atmospheric conditions either stagnant or dispersive (neutral) do occur together and represent a "worst-case" noise environment. Accordingly, two meteorological conditions were modeled: (1) a "typical" condition of no air stagnation and a very light breeze of 2.2 mph and (2) a "worst-case" condition of a stagnant atmospheric and a moderate breeze of 6.7 mph. Tables 3.3-7 through 3.3-14 present the results of the ENM modeling. Due to the operating hours of the project and the definition of nighttime (10:00 p.m. to 7:00 a.m. on weekdays and 10:00 p.m. to 9:00 a.m. on weekends/holidays), the project's nighttime noise levels are identical to its daytime levels. The location of the receivers (1-19, 21 and 22) used in the modeling of the Lower Site is shown in Figure 3.3-1 (Receivers 2 and 4 lie outside the area shown in Figure 3.3-1).

To view this figure, click on the link below.

Figure 3.3-1 Location of Receivers Used in the ENM Modeling of the Lower Site

TABLE 3.3-5 NOISE SOURCES AND THEIR LOCATION

1 2 3	D6 Dozer	D9 Dozer	992 Loader	988 Loader	ader			d	. 2	<u> </u>	_ <u>_</u>	la la	<u> </u>	[a]		-
1 2	D6 Do	D9 Do	92 Lo	_3		5 5	o s	cra	e T	s P	ete	lt P	yor	9 H	ay High	it & ete F
1 2	Õ	D	<u> </u>		980 Loader	Primary Crusher	Scalping Screens	Belly Scrapper	Service Truck	Process Plant	Concrete Plant	Asphalt Plant	Conveyor Belt	Cat 769 Haul Trucks	ighw rave]	Asphalt & Concrete Haul Trucks
2			5	86	86	₽D	ΧX	B	Š	P	Ö	¥	Ö	DE	H	AOE
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		X	X	X		X	X	X	X						X	
		X	X	X		X	X	X	X						X	1
4				X		X	X	X	X				X		X	
5				X	X				X	X			X		X	
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7	X	X	X		X	X	X	X	X					<u> </u>	X	1
8			X		X										X	
9	X	X	X		X	X	X	X	X						X	
10							•									-
All Phases	X	X	X	X		X	X	X	X					X	X	
	6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 11 Phases	6 7 8 9 X 10 1 2 3 4 5 6 7 8 9 X 10 0 1 1 2 3 4 5 6 7 8 9 X 10 0 11 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 6 7 8 9 10 1 2 3 4 5 7 X 8 X 9 X 10	6 7 8 9 X 10 1 X 2 X X 3 X 4	6 7 8 9 X 10 10 1	6	6	6	6	6	Color	Color	Color	6	Color	Color	Color

# **TABLE 3.3-6** PROJECT-GENERATED NOISE SOURCES NOISE LEVELS (in dBA) 50 FEET FROM SOURCE

Equipment	dBA
Bulldozer (Cat D6)	72
Bulldozer (Cat D9) <sup>3</sup>	85
Front-end loader (Cat 988) <sup>2</sup>	75
Primary crusher <sup>2</sup>	84
Processing facility <sup>2</sup>	79
Wash facility <sup>3</sup>	82
Conveyor belt transfer point <sup>3</sup>	67
Concrete facility <sup>3</sup>	82
Asphalt facility <sup>4</sup>	53-78
Loaded gravel truck traveling at 25 mph <sup>2</sup>	65
Loaded gravel truck Traveling at 55 mph <sup>2</sup>	67
Empty gravel truck traveling at 25 mph <sup>2</sup>	55

#### Sources:

- <sup>1</sup>Cadman, Inc., North Bend, WA-calculated from a D4
- <sup>2</sup> Cadman, Inc., Black Diamond Operation, Black Diamond, WA
- <sup>3</sup> Ellensburg Concrete Products, Ellensburg, WA

  <sup>4</sup> CSR, Inc., Everett Asphalt Facility, WA noise levels vary with direction

  <sup>5</sup> D9H at the 410 Quarry, Enumclaw, WA

# **TABLE 3.3-7** ALTERNATIVE 2 – PHASE 2 NOISE LEVELS (in dBA Leq) TYPICAL METEOROLOGICAL CONDITIONS

Receiver	Background Noise	Mine Noise Levels	Background plus Mine	KC Noise Code
	Levels	Day/Night	Levels	Day/Night
	Day/Night		Day/Night	
1-Lu Residence	50/47	12/12	50/47	57/47
2-Residence at 14118 475th	57/53	11/11	57/53	57/47
3-Residence at 47230 SE 144th	46/44	10/10	46/44	57/47
4-Residence A	49/42	6/6	49/42	57/47
5-Residence B	49/42	7/7	49/42	57/47
6-Residence C	49/42	6/6	49/42	57/47
7-Residence D	49/42	1/1	49/42	57/47
8-Residence E	49/42	1/1	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	20/20	50/47	57/47
12-NW-1	50/47	19/19	50/47	57/47
13- NW-2	50/47	19/19	50/47	57/47
14- NW-3	50/47	18/18	50/47	57/47
15- NE corner	50/47	20/20	50/47	57/47
16- SLM 1 & 6	51/48	15/15	51/48	57/47
17- SLM 2	53/49	5/5	53/49	57/47
18-SLM 3	45/44	10/10	45/44	57/47
19-SLM 4	53/50	6/6	53/50	57/47
20-SLM 5	49/42	0/0	49/42	57/47
21-SLM 7	52/48	17/17	52/48	57/47
22-SLM 8	58/58	15/15	58/58	65/65
23- Lutheran Camp	49/46	0/0	49/46	57/47
24- Washington State Patrol	53/50	0/0	53/50	57/47
Fire Training Academy				
25- Mine Creek Campground	49/46	0/0	49/46	57/47
26-Lu Auxiliary Res.	50/47	21/21	50/47	57/47

TABLE 3.3-8
ALTERNATIVE 2 – PHASE 2 NOISE LEVELS (in dBA Leq)
WORST-CASE METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels	Mine Noise Levels Day/Night	Background Plus Mine Levels	KC Noise Code
	Day/Night	, ·	Day/ Night	Day/Night
1-Lu Residence	50/47	35/35	50/47	57/47
2-Residence at 14118 475th	57/53	34/34	57/53	57/47
3-Residence at 47230 SE 144th	46/44	28/28	46/44	57/47
4-Residence A	49/42	4/4	49/42	57/47
5-Residence B	49/42	4/4	49/42	57/47
6-Residence C	49/42	3/3	49/42	57/47
7-Residence D	49/42	0/0	49/42	57/47
8-Residence E	49/42	0/0	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	32/32	50/47	57/47
12-NW-1	50/47	33/33	50/47	57/47
13-NW-2	50/47	34/34	50/47	57/47
14-NW-3	50/47	30/30	50/47	57/47
15-NE corner	50/47	30/30	50/47	57/47
16-SLM 1 and 6	51/48	30/30	51/48	57/47
17-SLM 2	53/49	20/20	53/49	57/47
18-SLM 3	45/44	34/34	45/44	57/47
19-SLM 4	53/50	24/24	53/50	57/47
20-SLM 5	49/42	0/0	49/42	57/47
21-SLM 7	52/48	30/30	52/48	57/47
22-SLM 8	58/58	25/25	58/58	65/65
23-Lutheran Camp	49/46	0/0	49/46	57/47
24- Washington State Patrol Fire	53/50	0/0	53/50	57/47
Training Academy				
25-Mine Creek Campground	49/46	0/0	49/46	57/47
26-Lu Auxiliary Res.	50/47	34/34	50/47	57/47

# TABLE 3.3-9 ALTERNATIVE 2 – PHASE 8 NOISE LEVELS (in dBA Leq) TYPICAL METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels	Mine Noise Levels Day/Night	Background Plus Mine Levels	KC Noise Code
Receiver	Day/Night	Day/Nigit	Day/ Night	Day/Night
1-Lu Residence	50/47	8/8	50/47	57/47
2-Residence at 14118 475th	57/53	8/8	57/53	57/47
3-Residence at 47230 SE 144th	46/44	6/6	46/44	57/47
4-Residence A	49/42	2/2	49/42	57/47
5-Residence B	49/42	2/2	49/42	57/47
6-Residence C	49/42	1/1	49/42	57/47
7-Residence D	49/42	0/0	49/42	57/47
8-Residence E	49/42	0/0	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	16/16	50/47	57/47
12-NW-1	50/47	15/15	50/47	57/47
13-NW-2	50/47	16/16	50/47	57/47
14-NW-3	50/47	15/15	50/47	57/47
15-NE corner	50/47	19/19	50/47	57/47
16-SLM 1 and 6	51/48	12/12	51/48	57/47
17-SLM 2	53/49	0/0	53/49	57/47
18-SLM 3	45/44	6/6	45/44	57/47
19-SLM 4	53/50	2/2	53/50	57/47
20-SLM 5	49/42	0/0	49/42	57/47
21-SLM 7	52/48	14/14	52/48	57/47
22-SLM 8	58/58	11/11	58/58	57/47
23-Lutheran Camp	49/46	0/0	49/46	65/65
24- Washington State Patrol Fire	53/50	12/12	53/50	57/47
Training Academy				
25-Mine Creek Campground	49/46	0/0	49/46	57/47
26-Lu Auxiliary Res.	50/47	16/16	50/47	57/47

TABLE 3.3-10
ALTERNATIVE 2 – PHASE 8 NOISE LEVELS (in dBA Leq)
WORST-CASE METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels Day/Night	Mine Noise Levels Day/Night	Background Plus Mine Levels Day/ Night	KC Noise Code Day/Night
1-Lu Residence	50/47	19/19	50/47	57/47
2-Residence at 14118 475th	57/53	23/23	57/53	57/47
3-Residence at 47230 SE 144th	46/44	19/19	46/44	57/47
4-Residence A	49/42	3/3	49/42	57/47
5-Residence B	49/42	3/3	49/42	57/47
6-Residence C	49/42	1/1	49/42	57/47
7-Residence D	49/42	0/0	49/42	57/47
8-Residence E	49/42	0/0	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	23/23	50/47	57/47
12-NW-1	50/47	25/25	50/47	57/47
13-NW-2	50/47	25/25	50/47	57/47
14-NW-3	50/47	22/22	50/47	57/47
15-NE corner	50/47	25/25	50/47	57/47
16-SLM 1 and 6	51/48	21/21	51/48	57/47
17-SLM 2	53/49	13/13	53/49	57/47
18-SLM 3	45/44	22/22	45/44	57/47
19-SLM 4	53/50	16/16	53/50	57/47
20-SLM 5	49/42	0/0	49/42	57/47
21-SLM 7	52/48	20/20	52/48	57/47
22-SLM 8	58/58	19/19	58/58	65/65
23-Lutheran Camp	49/46	11/11	49/46	57/47
24- Washington State Patrol Fire Training Academy	53/50	21/21	53/50	57/47
25-Mine Creek Campground	49/46	4/4	49/46	57/47
26-Lu Auxiliary Residence	50/47	25/25	50/47	57/47

TABLE 3.3-11
ALTERNATIVE 3 – PHASE 8 NOISE LEVELS (in dBA Leq)
TYPICAL METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels	Mine Noise Levels Day/Night	Background Plus Mine	KC Noise Code
17 D :1	Day/Night	7/7	Day/ Night	Day/Night
1-Lu Residence	50/47	7/7	50/47	57/47
2-Residence at 14118 475th	57/53	5/5	57/53	57/47
3-Residence at 47230 SE 144th	46/44	4/4	46/44	57/47
4-Residence A	49/42	1/1	49/42	57/47
5-Residence B	49/42	1/1	49/42	57/47
6-Residence C	49/42	0/0	49/42	57/47
7-Residence D	49/42	0/0	49/42	57/47
8-Residence E	49/42	0/0	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	14/14	50/47	57/47
12-NW-1	50/47	14/14	50/47	57/47
13-NW-2	50/47	14/14	50/47	57/47
14-NW-3	50/47	13/13	50/47	57/47
15-NE corner	50/47	15/15	50/47	57/47
16-SLM 1 and 6	51/48	10/10	51/48	57/47
17-SLM 2	53/49	0/0	53/49	57/47
18-SLM 3	45/44	4/4	45/44	57/47
19-SLM 4	53/50	0/0	53/50	57/47
20-SLM 5	49/42	0/0	49/42	57/47
21-SLM 7	52/48	12/12	52/48	57/47
22-SLM 8	58/58	10/10	58/58	57/47
23-Lutheran Camp	49/46	0/0	49/46	57/47
24- Washington State Patrol Fire Training Academy	53/50	26/26	53/50	57/47
25-Mine Creek Campground	49/46	0/0	49/46	57/47
26-Lu Auxiliary Res.	50/47	16/16	50/47	57/47

TABLE 3.3-12
ALTERNATIVE 3 – PHASE 8 NOISE LEVELS (in dBA Leq)
WORST-CASE METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels	Mine Noise Levels Day/Night	Background Plus Mine	KC Noise Code
240002702	Day/Night	24,77 (1911)	Day/ Night	Day/Night
1-Lu Residence	50/47	17/17	50/47	57/47
2-Residence at 14118 475th	57/53	20/20	57/53	57/47
3-Residence at 47230 SE 144th	46/44	18/18	46/44	57/47
4-Residence A	49/42	2/2	49/42	57/47
5-Residence B	49/42	2/2	49/42	57/47
6-Residence C	49/42	0/0	49/42	57/47
7-Residence D	49/42	0/0	49/42	57/47
8-Residence E	49/42	0/0	49/42	57/47
9-Residence F	49/42	0/0	49/42	57/47
10-Residence G	49/42	0/0	49/42	57/47
11-NW corner	50/47	21/21	50/47	57/47
12-NW-1	50/47	23/23	50/47	57/47
13-NW-2	50/47	23/23	50/47	57/47
14-NW-3	50/47	19/19	50/47	57/47
15-NE corner	50/47	21/21	50/47	57/47
16-SLM 1 and 6	51/48	18/18	51/48	57/47
17-SLM 2	53/49	10/10	53/49	57/47
18-SLM 3	45/44	20/20	45/44	57/47
19-SLM 4	53/50	13/13	53/50	57/47
20-SLM 5	49/42	7/7	49/42	57/47
21-SLM 7	52/48	19/19	52/48	57/47
22-SLM 8	58/58	0/0	58/58	57/47
23-Lutheran Camp	49/46	17/17	49/46	57/47
24- Washington State Patrol Fire Training Academy	53/50	13/13	53/50	57/47
25-Mine Creek Campground	49/46	24/24	49/46	57/47

TABLE 3.3-13
ALTERNATIVE 4 – PHASE 8 NOISE LEVELS (in dBA Leq)
TYPICAL METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels Day/Night	Mine Noise Levels Day/Night	Background Plus Mine Day/ Night	KC Noise Code Day/Night
Receivers 1-25	Varies	0/0	No Increase	57/47
20 SLM 5	49/42	0/0	49/42	57/47
23 Lutheran Camp	49/46	0/0	49/46	57/47
24 Washington State Patrol Fire Training Academy	53/50	26/26	53/50	65/65
25 Mine Creek Campground	49/46	0/0	49/46	57/47

TABLE 3.3-14
ALTERNATIVE 4 – PHASE 8 NOISE LEVELS (in dBA Leq)
WORST-CASE METEOROLOGICAL CONDITIONS

Receiver	Background Noise Levels Day/Night	Mine Noise Levels Day/Night	Background plus Mine Day/Night	KC Noise Code Day/Night
Receivers 1-19	Varies	0/0	No Increase	57/47
20- SLM 5	49/42	7/7	49/42	57/47
23 - Lutheran Camp	49/46	11/11	49/46	57/47
24 - Washington State Patrol Fire Training Academy	Not measured	30/30		57/47
25 - Mine Creek Campground	49/46	0/0	49/46	57/47

#### **Impacts of Offsite Traffic**

Although exempt from regulation under the King County Noise Ordinance, the noise impacts of project-generated traffic on public roads are subject to SEPA review and were examined using the FHWA model Stamina/Optima. The receptor locations are either private property or state parkland adjacent to the roads used by project truck traffic. The Stamina model likely somewhat overpredicts traffic noise on Exit 34 because it assumes that vehicles travel at least 30 mph. Table 3.3-15 summarizes the noise impacts of truck traffic.

TABLE 3.3-15
NOISE IMPACTS OF TRUCK TRAFFIC (in dBA Leq)

Scenario:	Exit 34 (next to Edgewick Inn)	Exit 38 (at Olallie State Park)	
Alternative 1			
Existing Noise Levels	58.4	55.6	
Alternative 2- Phase 8	68.7	55.6	
Alternative 3- Phase 8	63.8	68.4	
Alternative 4 - Phase 8	No project traffic	69.2	

#### Impacts of Noise on Wildlife

Research that has been conducted to examine the effects of noise on animals has focused primarily on investigations of high noise levels (above 100 dBA) on laboratory animals, studies of ambient noise measurements in barns or kennels, or the effects of aircraft noise. These studies generally indicate that if adverse effects are present, the effects do not occur until noise levels approach 95 to 100 dBA. Most animal species appear to adapt to ambient noise as part of their environment. Loud sudden noises would startle mammals and birds into sudden movement or flight. Animals are generally tolerant of regular, steady noise such as would be produced by the steady operation of mining machinery.

The Washington State Department of Fish and Wildlife has established guidelines to protect certain animal species from disturbance due to helicopter noise. These guidelines establish buffer zones of one-quarter mile and one-half mile both horizontally and vertically around the nesting areas of certain engendered bird species (such as the bald eagle, spotted owl and marbled murrelet). There are no listed species or nesting sites within a mile of the project area.

The following are the operation impacts for the alternatives.

#### ALTERNATIVE 1 – NO ACTION

There would be no impacts under this alternative.

#### ALTERNATIVE 2 – PROPOSAL

#### Onsite Noise

Tables 3.3-7 through 3.3-10 indicate that the project's noise levels at any receiver would not exceed the standards set out in the King County Noise Code including the more stringent nighttime (10 p.m. to 7 a.m.) standard of 47 dBA. The nighttime standard applies to 10 p.m. to 7 a.m. Monday through Friday and 10 p.m. to 9 a.m. on Saturday, Sunday and all legal holidays. Cumulative noise levels are the result of logarithmic addition of project noise levels and background levels. None of the receivers are predicted to show an increase in cumulative noise levels for either Phase 2 or Phase 8.

#### Offsite Truck Traffic

Alternative 2 would cause an increase of approximately 11 dBA in noise levels at the Exit 34 receptor site and no increase at Exit 38. This increase is defined by EPA as a "serious" impact.

#### **Alternative 2 – Lower Site Option**

The Lower Site Option would have the same impacts as those of Alternative 2.

#### ALTERNATIVE 3 – LOWER AND UPPER SITES (EXIT 34 AND EXIT 38)

#### Onsite Noise

Tables 3.3-11 and 3.3-12 indicate that the project's noise levels at any receiver would not exceed the standards set out in the King County Noise Code including the more stringent nighttime (10 p.m. to 7 a.m.) standard of 47 dBA. The nighttime standard applies to 10 p.m. to 7 a.m. Monday through Friday and 10 p.m. to 9 a.m. on Saturday, Sunday and all legal holidays. Cumulative noise levels are the result of logarithmic addition of project noise levels and background levels. None of the receivers are predicted to show an increase in cumulative noise levels for either Phase 2 or Phase 8.

#### Offsite Truck Traffic

Alternative 3 causes an increase of approximately 7 dBA at Exit 34 and 13 dBA at Exit 38. These increases are defined by EPA as "significant" and "serious" respectively.

# **Alternative 3 – Lower Site Option**

The Lower Site Option would have the same noise impact as that of Alternative 3.

In addition, Alternatives 3 and 4 would cause a slight increase in noise from trucks traveling on I-90. Project traffic represents only a small percentage of I-90 truck volumes so the effect of the project will be small.

## ALTERNATIVE 4 – UPPER SITE ONLY (EXIT 38)

#### Onsite Noise

Tables 3.3-13 and 3.3-14 indicate that the project's noise levels at any receiver will not exceed the standards set out in the King County Noise Code including the more stringent nighttime (10 p.m. to 7 a.m.) standard of 47 dBA. The nighttime standard applies to 10 p.m. to 7 a.m. Monday through Friday and 10 p.m. to 9 a.m. on Saturday, Sunday and all legal holidays. Cumulative noise levels are the result of logarithmic addition of project noise levels and background levels. None of the receivers are predicted to show an increase in cumulative noise levels.

# Offsite Truck Traffic

Alternative 4 would have no impact at Exit 34 and approximately 14 dBA at Exit 38. This increase associated with Exit 38 is defined by EPA as a "serious" impact.

## 3.3.4 Cumulative Impacts

Cumulative impacts are shown in Tables 3.3-7 through 3.3-15. The North Bend Mine will not increase cumulative noise levels adjacent to the Upper or Lower Sites. Cumulative noise levels will increase at Exit 38 (Olallie State Park) due to truck traffic on a road with a 50 mph speed limit. These cumulative increases are summarized in Table 3.3-15 and the increases due to any of the alternatives would be considered "significant" or "serious" under the draft EPA noise guidelines.

The noise modeling analysis shows that noise from the project will not be audible offsite over the existing background noise levels (with the exception of truck traffic on public roads). However, project noise may be audible during the periods of very low background noise (such as stoppages of traffic on I-90). Certain frequencies (such as backup alarms) may also be occasionally heard over the background noise environment.

## 3.3.5 Mitigation Measures

#### 3.3.5.1 Construction

The impacts of construction will be mitigated by adhering to the King County Noise Ordinance regulations. Construction work would not occur between the nighttime hours of 10 p.m. and 7 a.m. on weekdays and 10 p.m. and 9 a.m. on weekends. The following mitigation measures are proposed.

#### ALTERNATIVE 1 – NO ACTION

No mitigation measures required.

#### ALTERNATIVE 2 – PROPOSAL

• Ensure that all construction activities occur between 7 a.m. and 10 p.m. weekdays and weekends.

## **Alternative 2 – Lower Site Option**

• Same as Alternative 2.

#### ALTERNATIVE 3 – LOWER AND UPPER SITE S (EXIT 34 AND EXIT 38)

• Same as Alternative 2.

#### **Alternative 3 – Lower Site Option**

• Same as Alternative 2.

## ALTERNATIVE 4 – UPPER SITE ONLY (EXIT 38)

• Same as Alternative 2.

## **3.3.5.2 Operation**

No mitigation measures are required for the facility operation of any of the alternatives to meet the King County Noise Code, as no exceedances will occur.

Traffic noise impacts would be considered "significant" (5-10 dBA) or "serious" (greater than 10 dBA) according to draft EPA noise guidelines. The only effective mitigation for the truck noise levels is a reduction in speed and it may not be practical to redesignate the speed limit on the Olallie Park/SE Grouse Ridge Road. The following mitigation measures are proposed.

#### ALTERNATIVE 1 - NO ACTION

No mitigation measures required.

#### ALTERNATIVE 2 – PROPOSAL

- The asphalt facility should be oriented so that truck entrances face east and west and the exhaust fan is on the south side of the building.
- A low speed limit (less than 25 mph) should be maintained within the Lower Site lease area and out to Edgewick Road.
- Ensure that all Phase 1 activities occur between 7 a.m. and 10 p.m. weekdays and 9 a.m. and 10 p.m. weekends.
- The concrete facility should be located south of the asphalt facility so the latter can serve as a noise buffer for the concrete facility.
- Standard acoustic backup alarms should be replaced either with strobe light alarms (may require State approval) or background noise-sensitive alarms.

## **Alternative 2 – Lower Site Option**

Same as Alternative 2.

## ALTERNATIVE 3 – LOWER AND UPPER SITES (EXIT 34 AND EXIT 38)

Same as Alternative 3.

## **Alternative 3 – Lower Site Option**

Same as Alternative 2.

#### **ALTERNATIVE 4 – UPPER SITE ONLY (EXIT 38)**

No mitigation required.

# 3.3.6 Significant Unavoidable Adverse Impacts

The North Bend Gravel mine will have no significant noise impacts adjacent to the Upper or Lower Site operations. There will be significant unavoidable adverse impacts under Alternative 2, at SE 146th Street (Exit 34), and under Alternative 3, at Exit 34 and the Olallie State Park area (Exit 38), due to increases in noise levels with additional truck traffic. Under Alternative 4, there will be significant unavoidable adverse impacts due to increases in noise levels with additional truck traffic at Exit 38.